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# OBSERVATIONS ON HABIT AND DURATION IN POPULATIONS OF *ERYTHRANTHE MICROPHYLLA* AND *E. GUTTATA* (PHRYMACEAE)

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## ABSTRACT

All plants in populations of *Erythranthe microphylla* in a variety of habitats and water regimes in west-central California are annual, without rhizomes. All plants in populations of *E. guttata* are rhizomatous. These observations support a hypothesis that plants and populations of these monkeyflowers are not variable in their ability to produce rhizomes. Plants of *E. microphylla* appear to be "obligate annuals" (non-rhizomatous) in nature, not "facultatively perennial" (rhizomatous or not) in response to varying habitat conditions. Photographs of populations document the observations.

**KEY WORDS**: *Erythranthe*, Phrymaceae, duration, adaptation, environmental modification

In contrast to long-standing assumptions that plants of *Mimulus guttatus* sensu lato can be either "annual" (simply taprooted or fibrous-rooted) or "perennial" (rhizomatous) as a phenotypic response to environmental conditions, Nesom (2012) observed that the ability to produce rhizomes appears to be genetically controlled -- rhizomatous plants and populations are *Erythranthe guttata* while those non-rhizomatous are *E. microphylla*. As distinct species, these two entities have different geographic ranges (Nesom 2012, 2013), with *E. guttata* spread across a considerably broader area.

Below-ground morphology in numerous populations of *Mimulus guttatus* sensu lato was observed during field studies in mid June 2012 in west-central California (Butte, Plumas, Sierra, Nevada, Placer, El Dorado, Alpine, and Calaveras counties). At each population, I examined plants from the driest to wettest microhabitats and from crowded to non-crowded portions of the population.

All plants in populations examined in a variety of habitats and water regimes were either annual, without rhizomes (identified here as *Erythranthe microphylla*; examples in Figs. 1–5), or all were rhizomatous (and identified here as *E. guttata*; example in Fig. 6). As observed by various earlier botanists (see comments in Nesom 2012), rhizomatous plants generally occur in habitats with permanent water, while non-rhizomatous plants in seasonally wet or damp habitats. *Erythranthe microphylla* was encountered more commonly than *E. guttata.*

In other parts of its range, besides the habitats sampled here, *Erythranthe microphylla* is known to grow in rock depressions and on rocky ridges, along roadsides and on dry banks, and in oak-pine, mixed oak, and oak-chaparral communities. The water regimes for all habitats of the species, however, appear to be generally similar.

The observations here support the hypothesis that plants and populations of of *Mimulus guttatus* sensu lato are not variable in their ability to produce rhizomes. Plants of *E. microphylla* are "obligate annuals" (non-rhizomatous), not "facultatively perennial" (rhizomatous or not) in response to varying habitat conditions. At least the observations do not contradict such a hypothesis.

Figure 1. *Erythranthe microphylla*. Butte Co.: Seepy rock face (serpentine) of road cut along Hwy 70, W of Arch Rock Tunnel near Bear Creek crossing, 1650 ft, 15 June 2013.

Figure 2. *Erythranthe microphylla*. Calaveras Co.: Seepy road bank on south side of Hwy 4, ca. 2 mi SW of Bear Valley, 7000 ft, 17 June 2013.

Figure 3. *Erythranthe microphylla* (above and below). Plumas Co.: Frazier Creek, SE side of Graeagle along Hwy 89, 4400 ft, 16 June 2013. Plants varying greatly in size and population density — all are slenderly taprooted.

Figure 4. *Erythranthe microphylla* (above and below). El Dorado Co. South side of South Lake Tahoe along Hwy 50, shallow, wet to damp depressions in *Pinus ponderosa* woods, 6480 ft, 17 June 2013.

Figure 5. *Erythranthe microphylla*. Butte Co.: Rock wall beside small waterfall of Bear Creek, north side of Hwy 70, just W of Arch Rock Tunnel, 1650 ft, 15 June 2013.

Figure 6a. *Erythranthe guttata*. Sierra Co.: 3 mi NW of Sierraville on Hwy 89 in the Sierra Valley, plants in water and on sides and lips of ditch, profuse seepage from west bank of ditch, 4950 ft, 16 June 2013. All plants, even those on the drier east lip, produce rhizomes.

Figure 6b and c. *Erythranthe guttata*. Sierra Co.: 3 mi NW of Sierraville on Hwy 89.

Figure 6d and e. *Erythranthe guttata*. Sierra Co.: 3 mi NW of Sierraville on Hwy 89.

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